



**MISSOURI DEPARTMENT OF TRANSPORTATION  
MATERIALS ENGINEERING  
Jefferson City, Missouri**

**Test Method  
MoDOT T67  
PREPARATION OF CONCRETE  
FOR USE IN  
AASHTO T161 FREEZE AND THAW DURABILITY**

**1.0 SCOPE.**

**1.1** This test method describes the procedure for preparation of materials and concrete specimens for use in AASHTO T161, Procedure B, 35 day cure.

**1.2** Unless otherwise stated, specification section references are from the Missouri Standard Specifications for Highway Construction and its supplements.

**2.0 PROCEDURE.**

**2.1 Aggregate Preparation.**

**2.1.1** Obtain an approximate one megagram sample of stone from the ledge or source in question in the same manner as an initial approval sample (Field Section 1001.4.1 of the Materials Manual).

**2.1.2** Crush the entire sample to the desired maximum size. For MoDOT testing, this will be done in the Central Laboratory.

**2.1.3** Blend the entire sample of the crushed aggregate by the "windrow" method as follows. Clear a floor area large enough for the entire sample, insuring that it is cleaned and absent of moisture. Place the sample in an even number of windrows (minimum of 4) using approximately equal divided amounts. Combine two similar sized windrows at a time, starting from opposite ends of adjacent rows. A shovel full of aggregate taken from the end of the windrow is to represent the entire cross section from top to bottom to insure an even distribution of the aggregates. Using alternate shovel fulls from the opposite ends of adjacent rows, spread the aggregate down the length of a new row. Continue combining rows until only one windrow remains.

**2.1.4** Screen the crushed aggregate into individual fractions representing each sieve for the desired gradation(s) requirements of Sec 1005, which will depend on the ledge intended use and on past history of the ledge stone being tested. Enough material is to be screened so that it can be recombined into a total quantity suitable for testing, with a gradation meeting the middle of the gradation to be tested with the exception of the 1.18 mm material which is not monitored. All remaining material is stored for future use.



**2.1.5** Determine the specific gravity and absorption for each aggregate fraction in accordance with AASHTO T 85, for use in the concrete mix design.

**2.1.6** Determine the aggregate correction factors for each sample of ledge stone being tested in accordance with ASTM C 231.

## **2.2 Concrete Mix Design.**

**2.2.1** Unless otherwise required, design all concrete mixes for "Pavement Concrete" in accordance with Sec 501 to be air entrained at  $5.5 \pm 1.5$  percent air, using a cement factor of  $340 \text{ kg/m}^3$ \*, with the water content adjusted to provide a 40 mm slump, with a minimum of 25 mm and a maximum slump not to exceed that specified in Sec 501 for the designed class of concrete.

\*  $370 \text{ kg/m}^3$  for gradation F

**2.2.2** Use Class A Missouri River sand meeting Sec 1005.2.

**2.2.3** Use low-alkali Type I, portland cement meeting Sec 1019 and AASHTO M 85, Table 1A.

**2.2.4** Use air-entraining admixture meeting Sec 1054.

## **2.3 Concrete Batching and Curing.**

**2.3.1** Batch and cure the concrete in accordance with AASHTO T 126 except as noted herein. The procedures for batching and curing shall be identical for all batches.

**2.3.2** The materials and all batching shall be at room temperature. Temperature measurements of batches is not required.

**2.3.3** Each batch is to be sized to make 2 beams, 1 cylinder, 1 slump test, and 1 air test. Approximately  $0.035 \text{ m}^3$  is required.

**2.3.3.1** Cylinders shall be 152.4 mm in diameter and 304.8 mm in height.

**2.3.3.2** Beams shall be 88.9 x 114.3 x 406.4 mm.

**2.3.4** When more than 1 aggregate or variable is being tested, randomize the batching order to reduce the possible variations due to different mixing times.

**2.3.5** Make three batches per ledge or source to provide replicate samples for analysis purposes.



**2.3.6** Make a slump measurement in accordance with AASHTO T 119 immediately after mixing.

**2.3.7** Determine the air content of the fresh concrete batch in accordance with AASHTO T 152, Pressure Method.

**2.3.8** For each batch, moist cure the cylinder for 28 days and the beams for 35 days.

### **3.0 Curing and Testing.**

**3.1** Test one cylinder per batch for 28 day compressive strength in accordance with AASHTO T 22.

**3.2** Test one beam per batch to determine 35 day flexural strength by the "center point" method in accordance with AASHTO T 177. Use the second beam for AASHTO T 161 testing.

### **4.0 REPORT.**

**4.1** After batching, report the ledge number, source, location, specific gravities and absorptions of the aggregate; batching times, batch weights, material sources, slump and air tests for the fresh concrete mixture; and associated specimen identifications..

**4.2** After testing, report the specimen identifications, test method and test results.

